

Remarks

Status of the Application

Prior to entry of this amendment, claims 22-35 and 42-47 were pending. The final Office Action mailed December 14, 2010, the “Office Action” rejected claims 22-35, 42, 43 and 47 under § 103(a) as being unpatentable over Hammer (U.S. Patent 6,002,477), in view of Zhang et al, (Gallium nitride/conjugated polymer hybrid light emitting diodes: Performance and lifetime, Journal of Applied Physics, Vol. 84, No. 3, 1 August 1998, pp. 1579-1582.) The Office Action further rejected claims 44-46 under § 103(a) as being unpatentable over Hammer, in view of Zhang et al. and further in view of Dickert et al. (“Solvatochromic betaine dyes as optochemical sensor materials: detection of polar and non-polar vapors,” Sensors and Actuators B., 70, (2000), 263-269).

This paper amends claims 22, 25, 26 and 28. New claims 48-51 have been added. No claims are canceled. Hence, after entry of this paper, claims 22-35 and 42-51 will stand pending for examination. Claim 22 is an independent claim.

Claim Amendments

Claims 22, 25, 26 and 28 have been amended. In particular, Claims 22, 25 and 26 have been amended to clarify that electroluminescent organic material provides for the emission of at least two intensity maxima of different wavelengths of light. As described in detail below, this clarification serves to further distinguish the cited prior art. Support for the amendments to claims 22, 25 and 26 may be found in the application as published in at least lines 22-30, page 17 (describing a sensor using a disclosed LED) in combination with page 14 lines 3-8 describing an LED where one organic compound emits in at least two peaks. Alternatively, the support found at page 17 may be combined with Page 13 lines 4-30 where various LED structures having more than one organic electroluminescent compound are described.

Claim 28 has been amended to narrow the scope of this claim by eliminating poly(paraphenylene vinylene) compounds from the recited group. Support for this claim may be found in claim 28 as originally filed.

Claims 48-51 are new. Claims 48-49 depend from claim 22 and recite specific groups of organic electroluminescent compounds. Support for new claims 48-49 may be found in claim 28 as originally presented and in the published application at page 9 line 27 to page 10, line 4.

Claims 50-51 recite that the sensor system is miniaturized (claim 50) or included on a chip (claim 51). Support for these amendments may be found in the published application on page 5, lines 26-27.

Rejections under 35 U.S.C. § 103

Claims 22-35, 42, 43 and 47

Claims 22-35, 42, 43 and 47 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hammer, in view of Zhang et al. These rejections are respectfully traversed, because the final Office Action has not demonstrated that the cited combination either teaches or suggests each element of any rejected claim.

In particular, claim 22 as amended recites a detection system having an LED light source where at least one electroluminescent organic compound provides for the simultaneous emission of at least two intensity maxima of different wavelengths of light (detection and reference signals) plus a detector having a signal channel and a separate reference channel in optical communication with the LED. These elements may be relied upon to fully distinguish the combination of references cited in the Office Action.

Hammer has been cited in the Office Action to show a detection system with a single light source (a Xenon lamp) to generate a detection signal and a reference signal. The Office Action correctly notes that Hammer does not disclose a light emitting diode having at least one semiconductive electroluminescent layer, wherein the emission spectrum of the diode exhibits at least two intensity maxima. According to the examiner it would be obvious to use the LED of Zhang in the system of Hammer in order to obtain a semiconductor device that lasts longer and is capable of emitting a full range of colours. Applicant respectfully submits that this conclusion of obviousness is incorrect for the reasons described below.

Claim 22 has been amended to clarify that at least one layer of electroluminescent organic material provides for the simultaneous emission of at least two intensity maxima of different wavelengths of light. Although the LED of Zhang is more or less bimodal, the lower

peak at 460 nm is generated by inorganic GaN. The organic layer of the LED generates a broad spectrum; roughly from 450 nm or less to 800 nm, as clearly shown on Figure 3. Thus, Zhang fails to suggest two intensity maxima generated by a fully organic LED as recited in claim 22 as amended. This distinction provides certain advantages for the claimed system over the possible combination of Hammer and Zhang. For example, the implementation of the claimed system is more readily reproducible. In Zhang, the two peaks in the emitted spectrum are coming from two sources, namely the GaN LED and from an organic coating. A thicker or thinner organic coating will lead to a different ratio between the two wavelengths, and an inhomogeneous coating would lead to an inhomogeneous ratio between wavelengths. This problem will not occur in the claimed OLED system, since only one type of emitting system is present.

Furthermore, a skilled person in the field of designing detection systems comprising a signal channel configured to detect a detection signal and a separate reference channel configured to simultaneously detect a reference signal would not be interested in broad photoluminescence as is taught by both Zhang and Hammer. Broad luminescence may disturb detector performance. Ideally one skilled in the art would like to use one narrowly defined wavelength for detection purposes and another narrowly defined wavelength for reference purposes in order to achieve best specificity and most linear dynamic range. Both Zhang, which teaches a broad spectrum white light LED and Hammer which relies upon a broad spectrum discharge lamp thus teach away from the concept that is recited in claim 22. Accordingly Applicant respectfully submits that claim 22 and all claims depending from claim 22 are allowable over the combination of Hammer and Zhang.

In addition, the Office Action rejects claim 24 because Zhang mentions one of the compounds recited in the body of the claim (the polymer). The elements of claim 24 are not recited as a Markush Group. Claim 24 requires both, “an electroluminescent polymer and an electroluminescent single dye.” Zhang does not teach or suggest the presence of both an electroluminescent single dye and an electroluminescent polymer. Accordingly, claim 24 is believed to be allowable for the reasons set forth above with respect to claim 22 and because the combination of references relied upon to reject claim 24 do not show each additional element of claim 24.

Claim 47 has been rejected but the Office Action does not provide any specific indication of where in these references the teaching of a flexible carrier material may be found. On the contrary, neither the carrier for the LED of Zhang nor the system of Hammer is flexible. For Hammer, this is apparent from the figures and entire specification. Zhang teaches the use of a glass substrate which is inherently not flexible. Accordingly, claim 47 is believed to be allowable for the reasons set forth above with respect to claim 22 and because the combination of references relied upon to reject claim 47 do not show each additional element of claim 24.

New claims 48-51 also recite elements not shown or suggested by the combination of references relied upon in the Office Action.

The Office Action contends that the language of claims 25 and 26 merely recite an “intended use” which is being treated as non-limiting. Applicant respectfully disagrees. In particular, the examiner argues that the limitation, *“wherein the at least two different intensity maxima of the different wavelengths are emitted by a first and a second organic electroluminescent compound...”* is merely a non-limiting field of use. The intended use of the claimed device is appropriately contained in the preamble of Claim 22. The use of the device is as a “detection system.” The recited functional limitation concerning the simultaneous emission of at least two intensity maxima at different wavelengths of light is not a mere “intended use.” On the contrary, this recitation is an appropriate functional limitation which properly limits the scope of all claims. For example, a monochromatic system having an LED which produces light having only one intensity maximum would clearly fall outside of the scope of claims 25 and 26. The limiting nature of the recited language is emphasized by a comparison of claims 25 and 26. Claim 25 is limited to systems having two organic electroluminescent compounds. Thus, a system with a single organic compound would not read on this claim. On the contrary, claim 26 is limited to systems with a single organic electroluminescent compound that emits two intensity maxima. Accordingly, a system with two organic compounds would not read on this claim. The interpretation advanced in the Office Action would make the scope of claims 25 and 26 identical which is an unreasonable interpretation.

Functional language such as employed in claims 25 and 26 limiting the LED element are appropriate limitation in a claim. See K-2 Corp. v. Salomon S.A. 191 F.3d 1356, 1636, 52 USPQ2d 1001, 1004 (Fed. Cir. 1999). See also MPEP § 2173.05(g) where it is stated:

“There is nothing inherently wrong with defining some part of an invention in functional terms. Functional language does not, in and of itself, render a claim improper. In re Swinehart, 439 F.2d 210, 169 USPQ 226 (CCPA 1971).

A functional limitation must be evaluated and considered, just like any other limitation of the claim, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is used. A functional limitation is often used in association with an element, ingredient, or step of a process to define a particular capability or purpose that is served by the recited element, ingredient or step.”

Accordingly, applicant respectfully submits that the limitation “*wherein the at least two different intensity maxima of the different wavelengths are emitted by a first and a second organic electroluminescent compound...*” is a proper functional limitation on claim scope which must be considered by the Examiner.

The Examiner further states that applicant’s functional language is treated as non-limiting since, “it has been held that in device claims the device must distinguish from the prior art in terms of structure rather than function.” The Examiner cites In re Schreiber, 128 F.3d 143, 1477-78, 44 USPQ 2nd 1429, 1431-32 (Fed. Cir. 1997) to support this proposition. Applicant respectfully submits that the Examiner’s reliance on Schreiber is incorrect in this case. In the Schreiber matter, the cited prior art disclosed structure identical to the Schreiber claim. In particular, the cited prior art disclosed a “dispensing top” that has a “generally conical shape and opening at each end.” The Schreiber appellant admitted the prior art disclosed the same structure but he argued the prior art did not disclose that the structure could be used to dispense popcorn from an open ended popcorn container. Thus, the Schreiber appellant tried to distinguish an identical apparatus by stating that the claimed use (dispensing popcorn) was not recited in the prior art.

Interestingly, the examiner cites In re Casey in the second paragraph of page 4 of the office action for the proposition, “If the prior art structure is capable of performing the intended use then it meets the claim.” In the present matter, the combination of devices cited cannot function “in the same manner.” The Hammer device clearly cannot emit light having two intensity maxima from one or more organic layers since it has no organic layers. The Zhang device only emits one intensity maximum from the organic layer, as detailed above. The other

maximum is emitted from an inorganic GaN layer. Therefore, the Hammer device in combination with the Zhang device can never meet the limitation, “*wherein the at least two different intensity maxima of the different wavelengths are emitted by a first and a second organic electroluminescent compound,*” (claim 25) or, “*wherein the at least two different intensity maxima of the different wavelengths are emitted by one organic electroluminescent compound,*” (claim 26).

Claims 44-46

Claims 44-46 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hammer, in view of Zhang et al. and further in view of Dickert et al.. These rejections are respectfully traversed, because the final Office Action has not demonstrated that the cited combination either teaches or suggests each element of any rejected claim. In particular, claims 44-46 depend from claim 22 and are argued to be allowable for the reasons set forth above with respect to claim 22.

Conclusion

Applicant believes that the pending claims are in condition for allowance. If it would be helpful to obtain favorable consideration of this case, the Examiner is encouraged to call and discuss this case with the undersigned.

This paper constitutes a request for any needed extension of time and an authorization to charge all fees therefore to deposit account No. 19-5117, if not otherwise specifically requested. The undersigned hereby authorizes the charge of any fees created by the filing of this document or any deficiency of fees submitted herewith to be charged to deposit account No. 19-5117.

Respectfully submitted,

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